Claims

1. A transmission system comprising a optical source having an optical output, this optical output being modulated such that it has periods of operation having a first set of characteristics interspersed with periods of operation having a second set of characteristics, wherein the modulated optical output is split into at least a first and a second signal, the first signal delayed by an amount of time relative to the second signal before being mixed with the second signal such that a portion of the modulated optical output having the first set of characteristics in the first signal corresponds with a portion of the modulated optical output having the second set of characteristics of the second signal.

2. A transmission system as claimed in claim 1 where the first characteristic of the optical output is a constant frequency.

3. A transmission system as claimed in claims 1 or 2 wherein the delay mechanism comprises a length of optical fibre.

4. A transmission system as claimed in claim 3 wherein the optical fibre is single mode

5. A transmission system as claimed in any of the above claims wherein a portion of the second signal is gated for transmission, and substantially all of the gated portion of the second signal is mixed with a portion of the first signal.

6. A transmission system as claimed in any of the above claims wherein the laser is driven with a control signal in order to control the optical output frequency.

7. A transmission system as claimed in claim 6 where the laser is a semiconductor laser

8. A transmission system as claimed in any of claims 1 to 7 wherein the optical output is modulated by a modulation means external to the laser.

9. A transmission system as claimed in claim 8 where the modulation means is an acousto-optic modulator.

10. A transmission system as claimed in claim 8 where the modulation means is an electro-optic modulator.

11. A transmission system as claimed in claim 8 where the modulation means is a photoelastic modulator.

12. A transmission system as claimed in any of the above claims wherein the signals are combined before being mixed.

13. A transmission system as claimed in any of the above claims where the polarisation of the first signal is matched to that of the second signal before being mixed.

14. A transmission system as claimed in claim 13 where the delay line incorporates a polarising preserving fibre.

15. A transmission system as claimed in claim 13 where the polarisation is matched using a mechanical polarisation control device.

16 A transmission system as claimed in claim 13 where the polarisation is matched using an electro-optic polarisation control device.

17. A transmission system as claimed in any of the above claims where the system is a lidar system.

18. A lidar system comprising an optical source having an optical output, this optical output being modulated such that it has periods of operation having a first set of characteristics interspersed with periods of operation

having a second set of characteristics, wherein the optical output is split into at least a first and a second signal, the second signal being transmitted and received as a returned second signal, and the first signal delayed by an amount of time relative to the returned second signal before being mixed with the returned second signal such that a portion of the optical output having the first set of characteristics in the first signal corresponds with a portion of the optical output having the second set of characteristics of the returned second signal.

19. A gas sensor comprising a transmit part and a receive part, wherein the transmit part comprises an optical source having an optical output, this optical output being modulated such that it has periods of operation having a first set of characteristics interspersed with periods of operation having a second set of characteristics, this optical output being split into at least a first and a second signal, the second signal being delayed and combined with the first signal to produce a transmit signal such that the second set of characteristics is substantially coincident in time with the first set of characteristics, and the receive part comprises a detector capable of distinguishing the first and second sets of characteristics on receipt of the transmit signal.

20. A gas sensor as claimed in claim 20 wherein each set of characteristics comprise a constant frequency, where the frequency of the first is different to the frequency of the second.

21. A telecommunications system comprising an optical source having an optical output, this optical output being modulated with a modulating signal such that it has periods of operation having a first set of characteristics interspersed with periods of operation having a second set of characteristics, wherein the modulated optical output is transmitted to a remote location where it is received and demodulated using a demodulator to reproduce the modulating signal;

and at a point between generation of the optical output and demodulation the modulated optical output is split into at least a first and a second signal, the first signal delayed by an amount of time relative to the

second signal such that a portion of the optical output having the first set of characteristics in the first signal corresponds with a portion of the optical output having the second set of characteristics of the second signal to aid the reproduction of the modulating signal.

22. A telecommunications system as claimed in claim 21 wherein the modulated optical output is split into at least a first and a second signal before the signals are transmitted to the remote location.

23. A telecommunications system as claimed in claim 21 wherein the modulated optical output is split into at least a first and a second signal after the signals are transmitted to the remote location.

24. A method of transmitting an optical signal, comprising:

providing an optical source having an optical output;

modulating the optical output with a modulating signal such that it has periods of operation having a first set of characteristics interspersed with periods of operation having a second set of characteristics;

passing the modulated optical output to a receive part;

demodulating the received modulated optical output in the receive part to substantially reproduce the modulating signal;

and at a point between generation of the optical output and demodulation the modulated optical output is split into at least a first and a second signal, the first signal delayed by an amount of time relative to the second signal such that a portion of the optical output having the first set of characteristics in the first signal corresponds with a portion of the optical output having the second set of characteristics of the second signal to aid the reproduction of the modulating signal.

25. A method as claimed in claim 24 wherein the splitting takes place before the modulated optical output is passed to the receive part.

26. A method as claimed in claim 24 wherein the splitting takes place after the modulated optical output is passed to the receive part.